

AMENDMENT TO THE CLAIMS

1. **(Currently Amended)** A method of operating an internal combustion engine, comprising: introducing a nitrogen-containing detergent composition comprising

(A) a reaction product of a hydrocarbyl-substituted acylating agent and an amine selected from:

(i) the reaction product of a polyisobutenyl succinic anhydride derived from 200 to 1500 molecular weight high vinylidene polyisobutylene and polyethylenepolyamine;

(ii) the reaction product of a C12 to C20 alkenylsuccinic anhydride and an alkanolamine;

(iii) the reaction product of a mixture of polyisobutenylsuccinic anhydrides derived from 1500 to 3000 and 200 to 1500 molecular weight high vinylidene polyisobutylene, ethylene glycol, and dimethylaminoethanol; and

(iv) the reaction product of a polyisobutenylsuccinic anhydrides derived from 1500 to 3000 molecular weight high vinylidene polyisobutylene and heavy polyethylenepolyamines;

~~;~~ ~~wherein the detergent composition (A) is the reaction product of a polyisobutenylsuccinic acylating agent and a polyethylenepolyamine wherein the polyisobutenyl group has a number average molecular weight of 150 to 5000;~~

~~(B) a hydrocarbyl-substituted amine comprising: (i) a reaction product of a chlorinated polyisobutylene, a polyamine and a base; (ii) a di-hydroxyalkyl-substituted fatty amine; or (iii) combination thereof; or combinations of (A) and (B);₁ and optionally further comprising:~~

~~(C) a Mannich reaction product of a hydrocarbyl-substituted hydroxy-containing aromatic compound, an aldehyde, and an amine; wherein the Mannich reaction product is prepared from phenol alkylated with a polyisobutylene having a number average molecular weight of 120 to 3000, formaldehyde, and a secondary monoamine;~~

~~(D) a high molecular weight polyetheramine prepared by reacting one unit of a hydroxy-containing hydrocarbyl compound with two or more units of butylene oxide to form a polyether intermediate, and aminating the polyether intermediate by~~

~~reacting the polyether intermediate with an amine or with acrylonitrile and hydrogenating the reaction product of the polyether intermediate and acrylonitrile; or combinations thereof;~~

wherein the nitrogen-containing detergent composition is present in a fuel composition; and

wherein said fuel composition is supplied into a combustion chamber of the engine during the operation of the engine wherein the detergent composition improves the performance of a lubricating oil of the engine;

wherein the engine is lubricated by a lubricating composition comprising an oil of lubricating viscosity and one or more lubricating oil additives, where the lubricating oil has a phosphorus content below 0.1% by weight, a sulfur content below 0.5% by weight, and a sulfated ash content below 1.5% by weight;

wherein the engine is a spark-ignited or a compression-ignited engine having an exhaust treatment device;~~and~~

~~wherein the fuel composition may optionally comprise a mineral oil fluidizer at 0.3 to 1000 ppm by weight.~~

2. **(Cancelled)**

3. **(Previously Presented)** The method of claim 1 wherein the detergent composition improves the performance of the fuel composition and wherein the fuel composition comprises diesel fuel.

4. **(Cancelled)**

5. **(Cancelled)**

6. **(Cancelled)**

7. **(Cancelled)**

8. **(Original)** The method of claim 1 wherein the detergent composition further comprises a fuel additive selected from the group comprising a nitrogen-containing detergent, an amine-containing polyether, a lubricity agent, a fluidizer, a metal-containing detergent, a rust inhibitor, a corrosion inhibitor, an antioxidant, a low

temperature flow improver, a demulsifier, an antifoaming agent, a valve seat recession additive, a combustion improver, a metal deactivator, or a mixture thereof.

9. **(Cancelled)**

10. **(Previously Presented)** The method of claim 1 wherein the engine is a compression-ignited engine having an exhaust gas recirculation system.

11. **(Cancelled)**

12. **(Previously Presented)** The method of claim 1 wherein the fuel composition has a sulfur content below 80 ppm by weight.

13. **(Original)** The method of claim 1 wherein the engine is installed in a motor vehicle and has a recommended drain interval for the lubricating oil of the engine of greater than 6,000 miles.

14. **(Original)** The method of claim 1 wherein the engine is a stationary engine having a recommended drain interval for the lubricating oil of the engine of greater than 150 operational hours.

15. **(Cancelled)**

16. **(Cancelled)**

17. **(New)** The method of claim 1 wherein the nitrogen-containing detergent composition further comprises:

(B) a hydrocarbyl-substituted amine comprising: (i) a reaction product of a chlorinated 200 to 1500 molecular weight polyisobutylene, an alkanolamine and a base; (ii) a di-hydroxyalkyl-substituted fatty amine; or (iii) combination thereof.

18. **(New)** The method of claim 1 wherein the nitrogen-containing detergent composition further comprises:

(C) a Mannich reaction product of a hydrocarbyl-substituted hydroxy-containing aromatic compound, an aldehyde, and an amine; wherein the Mannich reaction product is prepared from phenol alkylated with a polyisobutylene having a

number average molecular weight of 120 to 3000, formaldehyde, and a secondary monoamine;

19. **(New)** The method of claim 18 wherein component (C), the Mannich, is the reaction product of an alkylphenol derived from 140 to 1500 molecular weight high vinylidene polyisobutylene, formaldehyde and ethylenediamine.

20. **(New)** The method of claim 1 wherein the nitrogen-containing detergent composition further comprises:

(D) a high molecular weight polyetheramine prepared by reacting one unit of a hydroxy-containing hydrocarbyl compound with two or more units of butylene oxide to form a polyether intermediate, and aminating the polyether intermediate by reacting the polyether intermediate with an amine or with acrylonitrile and hydrogenating the reaction product of the polyether intermediate and acrylonitrile; or combinations thereof.

21. **(New)** The method of claim 20 wherein component (D), the high molecular weight polyetheramine, is selected from:

(i) PEA-2 prepared by reacting one unit C12-15 alcohol with an average of 24 units of propylene oxide to form a propoxylated alcohol, reacting the propoxylated alcohol with acrylonitrile to form a nitrile and hydrogenating the nitrile;

(ii) PEA-1 prepared by reacting one unit C13 alcohol with an average of 20 units of butylene oxide to form a polyether intermediate, reacting the polyether intermediate with acrylonitrile to form a nitrile and hydrogenating the nitrile;

(iii) PEA carbamate prepared by reacting dodecylphenol and butylene oxide in a 1:20 mole ratio to form an intermediate and reacting the intermediate with a polyethylenepolyamine; and

(iv) the reaction product of PEA-2 and formaldehyde in a 1:1 mole ratio; or combinations thereof.